Impact assessment of alternative smart specialization policies for Hungarian NUTS 3 regions

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Outline

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Introduction

- Cohesion Policy 2014-2020: regional smart specialisation strategies (S3) become a condition for ERDF funding
- Smart specialisation policy aims at supporting growth by enabling each region to identify and develop its own competitive advantages
- S3 is a bottom-up development concept: pockets of potential future innovations (discoveries) developed by entrepreneurs may result in a change of the region’s future industrial structure
- Government: selects from alternatives (prioritisation) for policy support
- The method suggested in the S3 literature for economic impact assessment of the discoveries needs further development
- This presentation argues that economic impact models can play a significant role in the assessment of smart specialisation policies
Economic impact assessment in the selection from alternative discoveries

• Economic impact assessment: the estimation of the likely impacts of S3 on variables (like GDP, employment or wages) at the regional and supra-regional levels.

• The suggested approach for economic impact assessment in the smart specialisation literature: estimation of ‘direct and indirect resource inputs from both the private and public sector suppliers’ (Foray et al. 2011, p. 13).

• This approach identifies impacts with the so-called “backward linkages”.

• However this approach covers impacts only partially.
Structural decomposition analysis¹

– A comparative static method to identify the factors that contribute to sectoral/regional/national growth
– Numerical calculation of the amount of their contribution to total impact based on I-O data
– The demand side approach aims to break down aggregate output growth into changes in final demand, purchase structure

Decomposition of the demand-side impact of a policy supporting a particular industry (investment subsidy)

1) **Backward linkages**
   – The indirect effects of policy shock through input-output linkages between industries

2) **Investment demand effect**
   – The impact of increased investment demand on output

3) **Income effect**
   – The effects of increased capital income, indirect tax revenues and savings

4) **Changes in interregional trade**
   – The effects of increased domestic demand outside the region for local goods (as a result of higher local productivity)

5) **Changes in international trade**
   – The effects of increased foreign demand for local goods (as a result of higher local productivity)
Demand side impact decomposition: an example
Economic models for S3 impact assessment

• Much broader economic impacts can be estimated with economic models

• Suitable economic impact models should incorporate
  – the regional dimension (S3 interventions address regional development)
  – interregional interactions (trade, migration, technology spillovers)
  – industrial dimension of the regional economy (S3 interventions address selected industrial sectors)

• With multi-regional, multi-sectoral models the economic impacts of different development scenarios became comparable both at the regional and at the supra-regional levels
The GMR-Hungary policy impact assessment model

- **GMR**: Geographic Macro and Regional model


- Selected applications:
  - Cohesion Policy impact assessment for the Hungarian government (since 2004 continuously)
  - Cohesion Policy impact assessment for the European Commission (DG Regio, 2011)
  - FP6 impact assessment (2010)
  - policy impact assessment on Turkish regions (2014)
The GMR-Hungary model

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**MACRO block**
- Spatial-equilibrium
- Government intervention

**Regional SCGE block**
- Spatial-equilibrium
- Regional labor change
- Regional TFP change

**Regional TFP block**
- Changes in TFP
The regional SCGE block

- A recursive dynamic **multisectoral** spatial computable general equilibrium model
- **Spatial:**
  - Transportation cost (iceberg)
  - Interregional trade
  - Labour migration
  - Interregional capital re-allocation
- **General equilibrium:**
  - Utility maximizing households
  - Investment decisions
  - Government optimization
  - Production side (perfect competition)
  - Foreign markets (partially exogenous)
- **Model features:** it runs in GAMS, calibrated for 2010 with an estimated Hungarian multiregional input-output table for 20 Hungarian NUTS 3 regions and 39 NACE rev 2 industries
Illustrative policy simulations

• Example: applications in Hungarian regions and industries
• Based on available funds for regions and an estimated time schedule for investment between 2014 and 2023
• Data collected from EU Commission, Hungarian EMIR database
• Total funding: 25 billion EUR
• Only considered „physical investments” for the period between 2014-2020 (~1150 m EUR)
• For physical investment for the competitiveness of producers: 320 million EUR
• In the simulations we allocated 12 million EUR for each regionally highly embedded industrial sector in each region
Investment shocks to the selected industries (Million HUF)
Selection of industrial sectors for smart specialisation

- McCann - Ortega-Argilés (2015): a specialisation is smart if the region diversifies into sectors which are closely related to the dominant (i.e., highly embedded) industries of the region. This results in high regional knowledge spillovers.
- The density of input-output linkages with the rest of the region’s industries measures embeddedness in this context.
- We measure embeddedness by the concept of network centrality.
- Centrality: how central, how important a given node is within the network.
- Different centrality measures exist: degree, closeness, betweenness, etc.
Selection of industrial sectors for smart specialisation

• Connection to input-output analysis
  – An IO table describes the structure of the network where nodes are sectors and connections are product flows between these sectors

• We apply the Eigenvector centrality measure\(^2\)
  – The centrality score of a given node depends on the centrality score of its neighbours
  – This is a comprehensive measure of centrality, showing the importance of a node, not simply the number of its links (degree) or location within the network (closeness)
  – In an indirect way it captures the structure of the whole network

\(^2\) Bonacich (1972), Bonacich (2007)
The most embedded (central) sectors selected

- Baranya
  - Agriculture
  - Electricity, gas, steam and air conditioning supply
  - Public administration and defense; compulsory social security
- Budapest
  - Financial and insurance activities
  - Legal and accounting activities; activities of head offices; management consultancy activities and architectural and engineering activities; technical testing and analysis
  - Transportation and storage
- Győr-Moson-Sopron
  - Electricity, gas, steam and air conditioning supply
  - Real estate activities
  - Manufacture of motorvehicles and other transport equipments
The smart specialisation simulations

• The government’s problem: selection of one discovery (an innovative idea) for each region to support from the set of discoveries suggested by entrepreneurs
• In the first stage governments select those discoveries that diversify the three most embedded sectors (following McCann - Ortega Argilés 2015)
• Then there is a need for economic impact assessments in order to select the final discovery for each region
• In the GMR-simulations we assume that the same amount of public venture capital investment is needed for the support of each discovery
• We run the GMR-Hungary model to estimate the GDP impacts of alternative investment supports
• The model calculates regional and national effects of the alternative policies
Growth of GDP in Budapest

The graph shows the growth of GDP in Budapest from 2014 to 2029. The data is represented for three categories: FINA, SCIE, and TRAN. The growth rate is depicted in percentage points, with a noticeable increase around 2023, followed by a decline in subsequent years.
GDP growth in Baranya
Summary

- Economic impact assessment plays a central role in S3 prioritisation
- Economic effects estimated on the basis of ‘backward linkages’ are narrow compared to the full set of impacts - economic models estimate much broader impacts
- Illustrative smart specialisation policy impact assessments with the GMR-Hungary economic model
- The estimation of comparable regional, industrial and macroeconomic effects of alternative smart specialisation policies generate important information for policy makers
References

• Varga, A., Járosi, P., Sebestyén, T., Szerb, L. 2015 Extension and application of the GMR-Eurozone model towards the CEE regions for impact assessment of smart specialisation policies. GRINCOH Working Papers DOI: 10.13140/RG.2.1.5152.6567